sector probe 695 determines the average delay of the ten pings to determine the average roundtrip time once the wireless broadband router 690 has been admitted to a polling group. This delay indicates the customer's experienced speed on most downstream transfers excluding the shortest downstream transfers. One example of the average delay for ten pings is shown in FIG. 46, which is discussed below. In step 1312, the sector probe 695 then compares the delay for the first ping with the average delay of the last ten pings. In step 1314, the sector probe 695 measures the end time of the ping test. FIG. 13 ends in step 1316.

Channel Probe -- FIGS. 14-16

Upstream managers and downstream managers in a broadband wireless system manage upstream and downstream channels, respectively. Unfortunately, the upstream managers and downstream managers do not historically track the channels and the information related to the channels. In the broadband wireless system 100, the upstream manager 515 manages the upstream channels by issuing credits and receiving DONE messages. In this embodiment, the state of the channels are idle, polling, dedicated, and contention. Unfortunately, the upstream manager 515 also does not historically track the states of the channels.

The channel probe 590 measures performance of the broadband wireless system 100. The channel probe 590 determines channel information of the broadband wireless system 100. Those skilled in the art will appreciate that performance information includes channel information. The channel information is any information related to the upstream or downstream channels in a communication network. Some examples of channel information are a per-user breakdown of the time in each channel, bytes transmitted in each channel, and protocol types used in each channel.

FIG. 14 is a block diagram that illustrates the head end 500 with the channel probe 590 in an example of the invention. The additional components in the head end 500 as shown in FIG. 5 are not shown in FIG. 14 for the sake of

clarity in order to focus on the components related to the operation of the channel probe 590. The head end 500 includes the router 505, the switch 510, the upstream manager 515, the channel probe 590, the receiver system 550, and the base antennae 540. The channel probe 590 includes an interface 1410, a

5   processor 1420, and a memory 1430. The router 505 is connected to the switch 510. The switch 510 is connected to the upstream manager 515 and the interface 1410 via link 1402. The upstream manager 515 is connected to the interface 1410 and the receiver system 550 via link 1404. The receiver system 550 is connected to the base antenna 540. The interface 1410 is connected to

10   the processor 1420. The processor 1420 is connected to the memory 1430.

        The operation of the channel probe 590 is discussed below in greater detail in FIGS. 15-16. The channel probe 590 is any communication device configured to (1) receive a message in the broadband wireless system 100, (2) process the message to determine channel information in the broadband

15   wireless system 100, and (3) store the channel information in memory 1430. The message could be any instruction, data, message, or signaling that the channel probe 590 can determine channel information from. Some examples of messages are credits and DONE messages.

        In one embodiment, the channel probe 590 is a computer with a 133MHz

20   motherboard, wherein the motherboard comprises an Intel Pentium III 933 MHz processor, a Seagate Barracuda 30 GB hard drive, a 50-X CD-ROM, a 3.5" floppy drive, an ATI OMB video graphics accelerator, and two 3COM PCI 10/100 network interfaces cards. The motherboard has 6 PCI expansion slots, an AGP slot, 4 USBs, 2 serial ports, and 1 parallel port. An EIDE controller is used for the

25   peripheral drives. The motherboard also has 3 memory slots that supports PC100/PC133 SDRAM. In this embodiment, two 256 MB SIMMS total 512 MB RAM with one remaining slot for expansion to 768 MB. The channel probe 590 runs a Red Hat Linux version 6.2 as the operating system.

        In this embodiment, the channel probe 590 is connected to the upstream

30   manager 515 via the link 1402 and the link 1404. The channel probe 590 is connected to the switch 510 and the upstream manager 515 in order to receive a

copy of messages, such as DONE messages, from the wireless broadband router 690 and the wireless broadband router 625. The channel probe 590 is connected to the upstream manager 515 and the receiver system 550 in order for the channel probe 590 to receive a copy of messages, such as credits, issued

5   from the upstream manager 515. By receiving a copy of messages such as DONE messages and credits, the channel probe 590 can recreate the states of channels from idle, contention, polling, and dedicated states.

FIG. 15 is a flow chart for the channel probe 590 in an example of the invention. FIG. 15 begins in step 1500. In step 1502, the channel probe 590

10   receives a message. In one example, the message is a DONE message from the wireless broadband router 625 via the downstream manager 520 and the switch 510. In another example, the message is a credit from the upstream manager 515 that is being issued to one of the wireless broadband routers 625 or 690. The message received by the channel probe 590 could be the actual

15   message or a copy of the actual message. In different embodiments, the message could be copied by the switch 510, the upstream manager 515, the channel probe 590, or any device that has access to the message. Also, in different embodiments, the channel probe 590 is situated in the broadband wireless system 100 where the channel probe 590 can have access to messages

20   that can determine the channel information.

In step 1504, the channel probe 590 processes the message to determine channel information. The channel probe 590 then stores the channel information in the memory 1430 in step 1506. FIG. 15 ends in step 1508.

FIG. 16 discloses one embodiment of the invention, but the invention is

25   not restricted to the configuration provided below. Those skilled in the art will appreciate numerous variations in a channel probe configuration and operation that are within the scope of the invention. Those skilled in the art will also appreciate how the principles illustrated in this example can be used in other examples of the invention. In this embodiment, the channel probe 590 measures

30   the performance of the broadband wireless system 100 by tracking the state changes of the channel.